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| EXAMINER | |
|---|---|
| KIM, HEE-YONG | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/532,282 | KIJAK ET AL. | |
| | Examiner | Art Unit | |
| | HEE-YONG KIM | 2621 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *16 November 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1 and 3-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 November 2009* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

**DETAILED ACTION**

***Response to Amendment***

1. This office action is in reply to Applicant's Response dated November 16, 2009.

2. **Claim 1** has been amended and **claim 2** was cancelled.

3. **Claims 1, 3-10** are still pending in the present application.

***Response to Arguments***

4. Applicant's arguments with respect to claims 1-10 have been considered but are moot in view of the new ground(s) of rejection.

***Claim Objections***

5. **Claim 4** is objected to because of the following informalities. The claim cites as follows:

Method according to Claim 1, wherein the cost C is dependent on the quadratic distances between the signature of the candidate and those of the key images of the subset and in that T is the standard deviation of the distribution of the distances of the key images of the set from the candidate

dependent on the distribution of the distances of the key images of the set from the candidate.

However, the last 3 lines do not make sense that the candidate is dependent on the distribution of the distances of the key images of the set from the candidate. The examiner maintains that the standard deviation T is dependent on the distribution of the

distances of the key images of the set from the candidate and therefore interprets it as follows:

Method according to Claim 1, wherein the cost C is dependent on the quadratic distances between the signature of the candidate and those of the key images of the subset and in that T is the standard deviation of the distribution of the distances of the key images of the set from the candidate and is dependent on the distribution of the distances of the key images of the set from the candidate.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 103*

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. **Claim 1** is rejected under 35 U.S.C. 103(a) as being unpatentable over Paul E. Green (Analyzing Multivariate Data, The Dryden Press, 1978, pp.427-428) in view of Pena (Pattern Recognition Letter 20, pp.1027-1040) and further in view of Vailaya (Technical Report MSU-CPS-96-64) and further in view of Jain et al. (Algorithms for Clustering Data, Prentice Hall, 1988, pp.96-101), hereafter referenced as Green and Pena and Vailaya and Jain respectively.

Regarding **claim 1**, Green discloses *determination* (grouped, page 428, line 1-4) *of a subset* (cluster, page 428, line 1-4) *from among the set of key images* (cluster center, page 428, line 1-4) *such that the key images forming the said subset have a distance* (all object within prespecified threshold are grouped) *from the candidate less than a threshold T* (prespecified distance, page 428, line 1-4) and *deletion of the key images of the subset to form a new set of key images*(Once points enter a cluster they are removed from further processing)*, as disclosed in Sequential Threshold* (page 428, line 1-4).

However, Green fails to disclose *a method for use in interactive navigation of the video sequence comprising: random drawing of p, from the set of key images by automatically extracting shots of interest, p being calculated in such a way as to obtain a very good probability of drawing a key image of a prevalent shot, calculation of the cost C for each candidate, dependent on the distance from the key images of the set to that of the candidate, the distance relating to the signatures, and selection of the candidate minimizing the cost C; determination of a seed from among the key images of the subset such that it minimizes the cost function C for this subset.*

However, Pena discloses An Empirical Comparison of Four Initialization Methods for the K-Means Algorithms. Pena specifically discloses and selecting first seed the most centrally located instance (Step 1, Fig.3) in order to initialize seed (Initialization method, pp.10, line 11). Even though he selects subsequent seeds differently for parallel clustering K clusters, this method cane be used repeatedly in the sequential threshold method because once a cluster is formed it is excluded in the next run and a

new centroid is calculated. To get the most centrally located instance (instance is equivalent to key image), the instance with minimum cost (cost is Sum of distances between the candidate and the others, the distance defined by the square error (pp. 1028, right column, line 9-11) has to be selected. However, it would be computationally heavy to calculate the cost for all the instances. One way to reduce the computation is to select multiple samples at random and choose the instance with the most centrally located one.

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Green by specifically providing *random drawing of multiple(p) candidates from the set of key images, calculation of the cost C for each candidate*, *dependent on the distance from the key images of the set to that of the candidate, the distance relating to the signatures, and selection of the candidate minimizing the cost C*, in order to reduce the computation cost of selecting seed for the most centrally located. It is inherent in multiple random sampling, *p being calculated in such a way as to increase drawing a key image of a prevalent shot,* because it was well known that statistically multiple sampling increases selecting the probability of prevalent shot.

However, Green and Pena still fails to disclose *a method for use in interactive navigation of the video sequence; by automatically extracting shots of interest; determination of a seed from among the key images of the subset such that it minimizes the cost function C for this subset.*

However, Vailaya discloses Video Clustering. Vailaya specifically discloses *a method for use in interactive navigation of the video sequence (interactive tools for browsing and search image sequences, pp.3, line 38-39) and automatically extracting shots of interest* (Automatic clustering of travel video shots, pp.2, line 11-15) *, in order to browse and search interactively (pp.3, line 38-39).*

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Bradley and Green by specifically providing *a method for use in interactive navigation of the video sequence; by automatically extracting shots of interest,* in order to *browse and search interactively*. The combination of Green and Pena and Vailaya discloses *the distance (*Pena*:* square Error, pp. 1028, right column, line 9-11) *defined by the signature* (Vailaya: Color and Texture features, pp.4, line 5-7 before the bottom).
However, Green and Pena and Vailaya still fail to disclose *determination of a seed from among the key images of the subset such that it minimizes the cost function C for this subset.*

However, In a yet another same field of endeavor Jain discloses *determination of a seed from among the key images of the subset such that it minimizes the cost function C for this subset* (compute new cluster centers as the centroids of the clusters, see Algorithm For Iterative Partitional Clustering Step 3 at page 97), in order to minimize the square error (pp.96, line 1-4 below chapter 3.3.2).

Therefore, given this teaching, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Bradley and Green by

specifically providing *determination of a seed from among the key images of the subset such that it minimizes the cost function C for this subset*, as taught by Jain, in order to minimize the square error. The Green Sequential Threshold Method, incorporating the Pena selecting a seed the most centrally located instance, further incorporating the Vailaya interactive tools for browsing and search image sequences and automatic extraction of shots, further incorporating the Jain computing a new cluster, has all the features of claim 1. It is inherent in the combination of Green and Pena and Vailaya and Jain, *in order to refine the grouping of key image to those of interest for the interactive navigation of the video sequence*, because Vailaya discloses interactive tool for browsing and searching video sequences as mentioned above .

Regarding **claim 6**, the combination of Green and Pena and Vailaya and Jain, as applied to claim 1, discloses *shots of a sequence of video images, the sequence being split into shots* (Vailaya: shot detection, Fig.1), *shot being represented by one or more key images* (Vailaya: keyframe extraction, Fig.1), *signature or attribute* (Vailaya: Color and Texture features, pp.4, line 5-7 before the bottom), and *comprising a phase of partitioning the key images* (Vailaya: clustering, Fig.1), *on the basis of a comparison* (Pena: square error, pp. 1028, right column, line 9-11) *of the attributes* (Vailaya: Color and Texture features, pp.4, line 5-7 before the bottom) *of the key images, comprising a phase of initialization (Pena: selecting centroid) for the selection of at least two key images or seeds (*keyframe extraction*) on the basis of which the comparisons for the grouping (Pena: square error) are performed*

Regarding **claim 7**, the combination of Green and Pena and Vailaya and Jain, as applied to claim 6, discloses *wherein the partitioning phase implements an algorithm of the K-means or K-medoid type* (Jain: K-means type algorithm at the page 99) by citing that K-means type algorithms converge rapidly.

Regarding **claim 8**, the combination of Green and Pena and Vailaya and Jain, as applied to claim 6, discloses *wherein the initialization and partitioning phases are iteratively repeated* (Green: the process is repeated for the unclustered points, and so on, pp.428, line 1-4), *the key images of the most compact cluster obtained in the previous iteration being eliminated from the set processed at this previous iteration so as to provide a new set on which the new iteration is performed* (Green: Once points enter a cluster they are removed from further processing, pp.428, line 1-4).

Regarding **claim 10**, the combination of Green and Pena and Vailaya and Jain, as applied to claim 6, discloses *Method of selecting shots of interest* (inherent in multiple subsampling and Pena: selecting the most centered), *these shots being prevalent* (inherent in multiple sampling) *in the video sequence, characterized in that it implements implementing the method according to Claim 6, the shots of interest corresponding to the grouping performed about the first seed selected* (Green: Grouping a cluster in a prespecified distance, page 428, line 1-4).

8. **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Green and Pena and Vailaya and Jain in view of Palmer ("Density Biased Sampling: An Improved Method for Data Mining and Clustering", Proceedings of

ACM SIGMOD International Conference on Management of Data, 2000), hereafter referenced Palmer.

Regarding **claim 3**, the combination of Green and Pena and Vailaya and Jain discloses everything claimed as applied before (see claim 1), however it fails to disclose *wherein the key images are weighted, as regards their signature, as a function of the length of the shots of the video sequence that they characterize and in that the random draw is biased by the weight of the key images.* However the examiner maintains that it was well known in the art to provide the above as taught by Palmer.

In a similar field of endeavor Palmer discloses *wherein the key images are weighted, as regards their signature, as a function of the length of the shots of the video sequence that they characterize and in that the random draw is biased by the weight of the key images* ((iii)the sampling is biased by group size, page 3), in order to improve on uniform sampling (pp.2, right col., line 30-33).

Therefore it would have been obvious to one of ordinary person in the art at the time the invention was made to modify the combination of Green and Pena and Vailaya and Jain by providing the biased sampling, as taught by Palmer, in order to improve on uniform sampling. The Green Sequential Threshold Method, incorporating the Pena selecting a seed the most centrally located instance, further incorporating the Vailaya interactive tools for browsing and search image sequences and automatic extraction of shots, further incorporating the Jain computing a new cluster, further incorporating the Palmer biased sampling by group size, has all the features of claim 3.

9. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Green and Pena and Vailaya and Jain in view of Foote (US patent 6,774,917), hereafter referenced as Foote.

Regarding **claim 4**, the combination of Green and Pena and Vailaya and Jain discloses everything claimed as applied before (see claim 1). Bradley further discloses *wherein the cost C is dependent on the quadratic distances* (the sum of squared distances of each data point to nearest means) *between the signature of the candidate and those of the key images of the subset.* However it fails to disclose that *T is the standard deviation of the distribution of the distances of the key images of the set from the candidate and dependent on the distribution of the distance of the key images of the set from the candidates*.

In a similar field of endeavor Foote discloses Methods and Apparatus for Interactive similarity searching, Retrieval, and Browsing video. Specifically Foote discloses that a multiple of standard deviation is used as threshold(T) in the figure 18 and the column 5, line 36-39, for the purpose of detecting class membership effectively using statistics (col. 15, line 66 – col. 16, line 1-5).

Therefore it would have been obvious to one of ordinary person in the art at the time the invention was made to modify the combination of Green and Pena and Vailaya and Jain by providing *T as the standard deviation of the distribution of the distances of the key images of the set from the candidate and dependent on the distribution* (inherent in standard deviation) *of the distance of the key images of the set from the candidates*, as taught by Foote, for the purpose of detecting class membership

effectively using statistics. The Green Sequential Threshold Method, incorporating the Pena selecting a seed the most centrally located instance, further incorporating the Vailaya interactive tools for browsing and search image sequences and automatic extraction of shots, further incorporating the Jain computing a new cluster, further incorporating the Foote setting a multiple of standard deviation as threshold(T), has all the features of claim 4.

10. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Green and Pena and Vailaya and Jain in view of Wan et al. ("A multiresolution color clustering approach to image indexing and retrieval", Proceedings of 1998 IEEE International conference, pp.3705-3708), hereafter referenced as Wan.

Regarding **claim 5**, the combination of Green and Pena and Vailaya and Jain discloses everything claimed as applied before (see claim 1), however it fails to disclose *wherein the signature of an image relates to the dominant color*, in order to speed up the retrieval (pp. 3706, line, right col., 6-7)

In a similar field of endeavor Wan discloses the dominant color as a feature (sub clause 3.1, pp.3706, right col., line 14-23), which is equivalent to signature of an image relates to the dominate color.

Therefore it would have been obvious to one of ordinary person in the art at the time the invention was made to modify the combination of Green and Pena and Vailaya and Jain by providing the dominant color as a feature, as taught by Wan, in order to speed up the retrieval. The Green Sequential Threshold Method, incorporating the Pena

selecting a seed the most centrally located instance, further incorporating the Vailaya interactive tools for browsing and search image sequences and automatic extraction of shots, further incorporating the Jain computing a new cluster, further incorporating the Wan setting the dominant color as a feature, has all the features of claim 5.

11. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Green and Pena and Vailaya and Jain in view of Turi et al.(Proceedings of the LASTED international Conference Signal and Image Processing, Oct 27-31,1998,pp.345-349), hereafter referenced as Turi.

Regarding **claim 9**, the combination of Green and Pena and Vailaya and Jain disclose everything as claimed as above (see claim 8). However the combination of Green and Pena and Vailaya and Jain fails to disclose *wherein the stopping criterion for the iterations is dependent on the number of key images not belonging to the most compact cluster selected or else is dependent on the averages of the intra-cluster distances,*

In a similar field of endeavor Turi discloses K-means Clustering for Colour Image Segmentation with Detection of K. Turi specifically discloses *the stopping criterion dependent on the averages of the intra-cluster distances* (Equation 1 at the page 346), in order to make the process entirely automated (pp. 345, 3 lines below chapter 2).

Therefore it would have been obvious to one of ordinary person in the art at the time the invention was made to modify the combination of Green and Pena and Vailaya and Jain by providing the average intra-cluster distance as a stopping criterion, as

taught by Turi, in order to make the process entirely automated. The Green Sequential Threshold Method, incorporating the Pena selecting a seed the most centrally located instance, further incorporating the Vailaya interactive tools for browsing and search image sequences and automatic extraction of shots, further incorporating the Jain computing a new cluster, further incorporating the Turi Stopping Criterion as the average intra-cluster distance, has all the features of claim 9.

## ***Conclusion***

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HEE-YONG KIM whose telephone number is (571)270-3669. The examiner can normally be reached on Monday-Thursday, 8:00am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha Banks-Harold can be reached on 571-272-7905. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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